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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/172,389	10/14/1998	RONALD D. LARSON	10981013.1	9221

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EXAMINER
NGUYEN, KIMBINH T

ART UNIT	PAPER NUMBER
2671	21

DATE MAILED: 03/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/172,389	LARSON, RONALD D.
	Examiner	**Art Unit**	
	Kimbinh T. Nguyen	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _12 October 2004_.
2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1,4-10 and 21-26_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _1,4-10 and 21-26_ is/are rejected.
7) ☒ Claim(s) _22-26_ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All b) ☐ Some * c) ☐ None of:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____.
      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on

10/12/04 has been entered.

1.   Claims 1, 4-10 and 21-26 are pending in the application.

Claim Objections

2.   Claims 22-26 are objected to because of the claims 22-26 depend upon the

canceled claims (11-20). Appropriate correction is required.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1, 4-10 and 21-26 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Greene et al. (5,579,455) in view of Greene et al. (6,646,639).

Claim 1, Greene et al. (5,579,455) discloses a hierarchical tiler (hierarchical z-

buffer visibility uses an octree spatial subdivision) configured to occlusion test

primitives, the primitives comprising a maximum z value and a minimum z value (z-max

elements, z-min elements; col. 11, lines 5-12), Greene et al. (5,579,455) does not teach

the maximum and minimum z values associated with respective X-Y coordinate values;

however, Greene et al. (6,646,639) teaches the maximum and the minimum z values

(zfar and znear values) associated with x-y coordinates values (col. 21, line 28 through

col. 22, line 20, figs 14 and 15), Greene (5,579,455) teaches the hierarchical tiler

creates a z pyramid data as polygons defined by primitives are processed by the multi-

function unit (col. 3, lines 61-64); Greene (6,646,639) teaches a parameter interpolator

coupled to the hierarchical tiler configured to receive the X-Y coordinate values from the

hierarchical tiler and generate a z value at the pixel level for each received X-Y

coordinate value (col. 25, line 33 through col. 28, line 44); a pixel-level comparator

determines which values need to be written by a frame buffer controller; a memory unit

stores a change in a z-pyramid data structure responsive to an occlusion test result

before the pixel level comparator determines which pixel level values need to be written

by the frame buffer controller (abstract). It would have been obvious to one of ordinary

skill in the art at the time the invention was made to incorporate the zfar and znear

associated with the x-y coordinate system taught by Greene (6,646,639) into the

hierarchical z buffer visibility of Greene (5,579,455) for improving occlusion culling in

graphic systems, because it would create a data structure adapted for use during

conservative stencil culling (col. 5, lines 50-51).

Claim 4, Greene et al. (5,579,455) discloses the z pyramid data structure is periodically updated in accordance with pixel level values from a buffer responsive to the frame buffer controller (col. 5, line 50 through col. 6, line 36).

Claim 5, Greene et al. (5,579,455) discloses the pixel level comparison is performed responsive to the pixel level values from a z buffer responsive to the frame buffer controller (col. 5, line 50 through col. 6, line 46; col. 10, lines 8-27).

Claim 6, Greene et al. (6,646,639) discloses an object function unit coupled to the pixel level comparator and the z buffer configured to perform one function selected from clipping (figs. 21-26).

Claim 7, Greene et al. (5,579,455) discloses the hierarchical tiler maintains coverage masks to update the z pyramid (coarsest level and finest level) data structure (col. 19, line 44 through col. 20, line 7).

Claim 8, Greene et al. (5,579,455) discloses the z pyramid comprises levels (four levels; fig. 5), each level comprising regions (2x2 region, 4x4 region), each region comprising subregions (display cells), each subregion comprising a z value (depth value), (see col. 10, lines 8-44; figs. 5 and 5A).

Claim 9, Greene et al. (5,579,455) discloses the hierarchical tiler compares the minimum z value with the z value of a region to determine if the primitive is occluded (col. 26, lines 61-67).

Claims 10 and 21, Greene et al. (5,579,455) discloses when the primitive is not fully occluded, the hierarchical tiler determines whether any subregion is fully covered;

when the subregion is covered, the hierarchical tiler determines whether the z value of the subregion is to be replaced with the zmax value (col. 19, lines 44-49; fig. 12).

Claims 22 and 23, Greene et al. (5,579,455) discloses the hierarchical tiler maintains a coverage mask for each level of z pyramid; when the hierarchical tiler determines the zmax value is less than the z value for covered subregion, a bit in the coverage mask associated with the covered subregion is set (col. 17, lines 26-32).

Claims 24 and 26, Greene et al. (5,579,455) discloses when all the coverage mask bits have been set in the coverage mask associated with a first level of the z pyramid, a bit is set for the corresponding region in the coverage mask associated with the next level up in the z pyramid (col. 18, lines 9-19).

Claim 25, Greene et al. (5,579,455) discloses when the bits in the coverage mask have been set for a particular region in the coverage mask, the hierarchical tiler replaces the zmax value with the zmax value of subregion (fig. 19A).

5.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimbinh T. Nguyen whose telephone number is (703) 305-9683. The examiner can normally be reached on Monday to Thursday from 7:00 AM to 4:30 PM. The examiner can also be reached on alternate Friday from 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

March 2, 2005

KIMBINH T. NGUYEN
PRIMARY EXAMINER